The influence of specific language impairment on child, parent and dyadic behaviour: comparison of receptive and expressive language impairment

Suvi Iiris Susanna Hakala
Master's thesis
Psychology
Faculty of Medicine
January 2018
Supervisors: Anu-Katriina Pesonen and Kati Heinonen-Tuomaala
Research group: Helsinki Longitudinal SLI study

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

Tiedekunta/Osasto Fakultet/Sektion – Faculty	Laitos/Institution– Department	
Faculty of Medicine / Department of Psychology and Logopedics		
Tekijä/Författare – Author		
Suvi Hakala		
Työn nimi / Arbetets titel – Title		
The influence of specific language impairment on child, parent and dyadic behaviour: comparison of receptive and expressive language impairment		
Oppiaine /Läroämne – Subject		
Psychology		
Työn laji/Arbetets art – Level	Aika/Datum – Month and year	Sivumäärä/ Sidoantal – Number of pages
Master's thesis	January 2018	55

Tiivistelmä/Referat – Abstract

Objectives: Specific language impairment (SLI) is an impairment of oral language, which places demands on parent-child interaction, putting children at-risk for adverse developmental outcomes. Little is known about how different types of language impairment affect parent-child interaction. This study aims to examine how language impairment influences child, parent and dyadic behaviours between dyads with children who have expressive- and receptive-SLI.
Methods: The sample included 85 children aged 36-81 months participating in the Helsinki Longitudinal SLI study. The sample consisted of 53 children with expressive-SLI (F80.1), and 32 children with receptive-SLI (F80.2). Parent-child interaction was evaluated using Erickson's sensitivity scales during drawing, puzzle-making, and free play. Groups were compared using analysis of covariance and Mann-Whitney U tests.
Results and conclusions: Children with expressive-SLI were found to be more persistent, enthusiastic, compliant and have a more positive experience of the interaction overall, when compared to children with receptive-SLI. SLI did not have a statistically significant effect on any of the parent and dyadic variables. Group means suggest that some parents may provide less emotional support and instruction to children with receptive-SLI. This could support earlier findings, which suggest that parents of language-impaired children adjust their behaviour to that of their children. Less active participation and poorer experience of the expression of children with receptive-SLI suggests that they need more support facilitate participation.

Avainsanat – Nyckelord – Keywords
specific language impairment, parent-child interaction, dyadic, receptive, expressive, sensitivity

Säilytyspaikka – Förvaringställe – Where deposited
University of Helsinki Library – Helda / E-thesis (*ethesis.helsinki.fi*)

Muita tietoja – Övriga uppgifter – Additional information

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

Tiedekunta/Osasto Fakultet/Sektion – Faculty	Laitos/Institution– Department
Lääketieteellinen tiedekunta / Psykologian ja logopedian osasto	

Tekijä/Författare – Author

Suvi Hakala

Työn nimi / Arbetets titel – Title

Kielellisen erityisvaikeuden vaikutus lapsen, vanhemman ja dyadin toimintaan: puheen tuottamiseen ja ymmärtämiseen painottuvien kielellisten erityisvaikeuksien vertailu

Oppiaine /Läroämne – Subject

Psykologia

Työn laji/Arbetets art – Level	Aika/Datum – Month and year	Sivumäärä/ Sidoantal – Number of pages
Pro gradu -tutkielma	Tammikuu 2018	55

Tiivistelmä/Referat – Abstract

Tavoitteet: Kielellinen erityisvaikeus on kielen kehityksen häiriö, joka asettaa haasteita lapsen ja vanhemman väliselle vuorovaikutukselle ja on täten merkittävä riskitekijä lapsen kokonaisvaltaiselle kehitykselle. Aiemman tutkimuksen perusteella tiedetään vähän siitä, miten erilaiset kielelliset vaikeudet vaikuttavat lapsen ja vanhemman vuorovaikutukseen. Tämän tutkimuksen tavoitteena oli tutkia miten puheen tuottamiseen ja ymmärtämiseen painottuvat kielelliset erityisvaikeudet vaikuttavat lapsen, vanhemman ja dyadin toimintaan lapsen ja vanhemman vuorovaikutuksessa.
Menetelmät: Tutkimuksen otos koostui Helsinki Longitudinal SLI study – seurantatutkimukseen osallistuneista lapsista ja vanhemmista. Tutkimukseen osallistui 85 lasta, joiden iät vaihtelivat välillä 36–81 kuukautta. Lapsista 53 lapsella oli puheen tuottamiseen erityisvaikeus (F80.1) ja 32:lla puheen ymmärtämisen erityisvaikeus (F80.2). Vuorovaikutusta arvioitiin Ericksonin sensitiivisyys-asteikkoja käyttäen piirustuksen, palapelin kokoamisen ja vapaan leikin aikana. Diagnoosiryhmiä vertailtiin kovarianssianalyysillä ja Mann-Whitney U testeillä.
Tulokset ja johtopäätökset: Kielellisellä erityisvaikeudella oli tilastollisesti merkitsevä yhteys lapsen sinnikkyyteen, innokkuuteen, myöntyväisyyteen sekä lapsen kokemukseen istunnosta. Ne lapset, joilla kielellinen vaikeus painottui puheen tuottamiseen, olivat innokkaampia, sinnikkäämpiä, tottelevaisempia ja kokivat vuorovaikutuksessa enemmän onnistumisia ja pystyvyyttä. Kielellisellä erityisvaikeudella ei ollut tilastollisesti merkitsevää vaikutusta vanhemman tai dyadin toimintaan. Keskiarvoerot viittaisivat siihen, että lapsen ymmärtämiseen painottuvat kielelliset ongelmat saattavat heijastua osalla vanhemmista vähäisempään emotionaaliseen tukeen sekä ohjeistuksen laatuun ja ajoitukseen. Tämä tukee aiempia löydöksiä, joissa kielihäiriöisten lasten vanhemmat saattavat olla vähemmän responsiivisia, koska näiden lasten vuorovaikutus tarjoaa vähemmän tilaisuuksia vastata. Reseptiivisen ryhmän heikompi osallistuvuus ja kokemus vuorovaikutuksesta viittaavat siihen, että nämä lapset tukea osallistuakseen vuorovaikutukseen aktiivisesti.

Avainsanat – Nyckelord – Keywords

kielellinen erityisvaikeus, lapsen ja vanhemman vuorovaikutus, dyadi, reseptiivinen, ekspressiivinen, sensitiivisyys

Säilytyspaikka – Förvaringställe – Where deposited

Helsingin yliopiston kirjasto – Helda / E-thesis (*ethesis.helsinki.fi*)

Muita tietoja – Övriga uppgifter – Additional information

1. Introduction

Specific language impairment (SLI) is a heterogeneous disorder of language development that affects language acquisition in childhood (Leonard, 2014). SLI presents as primarily expressive (F80.1 Expressive language disorder) or receptive (F80.2 Receptive language disorder), and is caused by a functional brain abnormality that is considered as being at least partly hereditary (Bishop, 2003). SLI impedes the child's ability to interact with others during day-to-day activities (SLI: Current care guidelines, 2010), and language impairments place children at risk for a number of negative developmental outcomes (Antoniazzi, Snow, & Dickson-Swift, 2010; Helland, Helland, & Heimann, 2014; Whitehouse, Watt, Line, & Bishop, 2009). Parent-child interaction is an important arena for the child's language and socioemotional development. High quality parent-child interaction that is characterized by sensitive, warm and responsive parenting, that provides guided opportunities for learning and promotes a synchronous relationship between parent and child, is associated with a number of positive developmental outcomes (Kochanska, Murray, & Harlan, 2000; Lengua, Honorado, & Bush, 2007; Lengua et al., 2014), including the development of expressive and receptive language skills (Hammer, Tomblin, Zhang, & Weiss, 2001; Noel, Peterson, & Jesso, 2008; Pungello, Iruka, Dotterer, Mills-Koonce, & Reznick, 2009). Parent-child interaction is affected by a child's language impairment, and language impairments may place additional demands on parent-child interaction as the parent has to adjust to the child's level of language skills. Past research has illustrated that parent-child interaction in dyads with SLI and language-impaired children differs from dyads with typically developing children (Bruce, Hansson, & Nettelbladt, 2010; Conti-Ramsden & Friel-Patti, 1984; Cunningham, Siegel, Van der Spuy, Clark, & Bow, 1985; Rescorla & Fechnay, 1996; van Balkom, Verhoeven, & van Weerdenburg, 2010). Studies have focused mainly on the conversational features of interaction (topic initiation, maintenance, coherence, turn-taking) and less on unique aspects of interaction in the parent-child relationship. Moreover, little is known about how different types of language impairments (expressive vs. receptive) influence parent-child interaction. This study aims to explore how parent-child interaction differs in terms child, parent and dyadic behaviours between dyads with children who have expressive and receptive forms of SLI. A better understanding of how parent-child interaction is influenced by different kinds of language impairments will enable

better identification and support for families with children, who are at risk for developing patterns of interaction that pose further challenges for the child's development.

1.1 Specific language impairment (SLI)

Specific language impairment (SLI) is a significant and enduring deficit in oral language that occurs despite normal hearing ability, and no oral structural abnormality or neurological damage (Leonard, 2014). SLI is characterised by deficits in receptive and/or expressive language skill together with normal development of non-verbal reasoning. Impairment in SLI cannot be accounted for by significant deficits in emotional functioning or early social environment (SLI: Current care guidelines, 2010). Language development might initially proceed normally, with first words appearing on time, but vocabulary expansion and the development of sentence-level speech are delayed. SLI can be reliably diagnosed from the age of 4 onwards, and the clinical picture changes as the child grows. Speech typically becomes clearer as the child learns to manage their impairments. Despite improvement in speech, children with SLI often continue to have difficulties in comprehension of long sentences with complex conceptual information (SLI: Current care guidelines, 2010), and continue to learn new words slower than their typically developing peers (Casalini et al., 2007; Girbau & Schwartz, 2008). A review of several prevalence studies gave a prevalence rate of 2-3% for delays in expressive or receptive language (Law, Boyle, Harris, Harkness, & Nye, 2000). The prevalence rates for SLI in Finnish populations has been estimated lower, ranging from 0.5-0.69% (Hannus, Kauppila, & Launonen, 2009; Helminen & Vilkman, 1990). Prevalence rates have been found to vary by gender (Hannus et al., 2009; Law et al., 2000; Luotonen, 1995; Tomblin et al., 1997), and some studies report that the rate of severe SLI is three times higher for boys than girls (Bishop, 2003). Similarly, studies in Finnish samples have reported ratios of 3.1:1 for boys to girls in SLI diagnoses (Hannus et al., 2009; Luotonen, 1995).

Children who continue to meet diagnostic criteria during the school years, experience progressively greater difficulties over time in a number of academic skills, e.g. vocabulary growth, reading and spelling (Silva, Williams, & McGee, 1987; Simkin & Conti-Ramsden, 2006; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998), and numeracy (Durkin, Mok, & Conti-Ramsden, 2013; Koponen, Mononen, Rsnen, & Ahonen, 2006). Because difficulties

in understanding impede encoding and processing of information, language impairments also affect children's nonverbal performance (Dunn, Flax, Sliwinski, & Aram, 1996). In addition to the detrimental effects on academic skills, language impairments have a negative impact on overall psychosocial development (Antoniazzi et al., 2010; Helland et al., 2014). Children with SLI have issues in forging friendships with peers, and struggle with peer acceptance (Helland et al., 2014). Impairments in the child's social functioning are reported by parents of children with SLI as well as children themselves (Nicola & Watter, 2015).

Children with SLI form a heterogeneous group with notable variability in presenting symptoms. Diagnostically children are classified as having either predominantly expressive (expressive language disorder, F80.1; ICD-10) or receptive (receptive language disorder, F80.2; ICD-10) language related difficulties. SLI is diagnosed using a discrepancy criteria, where receptive and/or expressive language skills are two or more standard deviations below the age-related norm, and at least one standard deviation below the nonverbal IQ (SLI: Current care guidelines, 2010). Nonverbal communication as well as symbolic language ability should both be within age-related norms, and overall IQ should be above 70 to rule out pervasive developmental disorders (SLI: Current care guidelines, 2010).

1.1.1 Expressive language impairment

Expressive-specific language impairment (expressive-SLI) is characterized by difficulties in using spoken language at an age-appropriate level, while language comprehension is normal (ICD-10). Speech is unclear and difficult to understand because of missing words, inflections and/or inappropriate sentence structure. Children with expressive language impairment may have difficulties in producing speech and non-speech sounds and short utterances, have dysfluent speech and mispronounce words, use grammatical structures incorrectly and/or leave out words and inflections (Rapin & Allen, 1987 as cited in Bishop, 1997). On the other hand, a child with expressive language impairment may produce normal speech sounds, but have difficulty in producing coherent language and narratives, and use overly simplistic syntax for their age-level (Rapin & Allen, 1987 as cited in Bishop, 1997). Though it is possible for children to have impairments primarily focused on expressive language, most children also have some level of impairment in comprehension (Bishop, 1997).

The manifestation of expressive language impairment varies widely from one child to the next, and changes over time as the child develops. A study comparing volubility in a sample of 2-years with expressive-SLI and a control group of age-matched typically developing children, showed that children with expressive-SLI tended to have fewer vocalizations at age 2 (Rescorla & Ratner, 1996). The authors hypothesize that children with ELI might avoid saying difficult words and be less engaged in conversation overall, which in turn elicits fewer conversational initiations from their parents (Rescorla & Ratner, 1996). A follow-up study found that the gap in the amount of speech between children with expressive-SLI and typically developing children disappears by age 3, but the intelligibility of speech continues to lag behind for children with expressive-SLI. The results of the study showed that only half of the children with expressive-SLI reached age-appropriate levels of intelligibility (Roberts, Rescorla, Giroux, & Stevens, 1998).

1.1.2 Receptive language impairment

Receptive-specific language impairment (receptive-SLI) is characterized by difficulties in understanding language at an age-appropriate level, and almost all cases present with concomitant difficulties in expressive language (ICD-10). Like expressive language impairment, receptive language impairment can manifest with different levels of severity. A child with receptive-SLI may be completely unable to understand speech, but able to understand gestures (Rapin & Allen, 1987 as cited in Bishop, 1997). On the other hand, impairment might be restricted to abstract language, and the child might have fairly good comprehension of language referring to concrete things and events (Rapin & Allen, 1987 as cited in Bishop, 1997).

Receptive language impairment can be considered a more severe form of SLI than expressive impairment (Bishop, 2006; Clark et al., 2007). Children in these diagnostic groups share many of the same difficulties, but they seem to be more comprehensive and severe for children diagnosed with receptive language impairment (Bishop, 2006; Clark et al., 2007). Children with receptive language impairment have difficulties in understanding and using words and grammatical structures (Leonard, 2014). Children with receptive language impairment also have difficulty in inferring information that is provided to them indirectly (Norbury & Bishop, 2002). Moreover, children with receptive-SLI struggle to make inferences in the context of a

story, and make inferences that might be generally correct, but disregard the context provided by the story (Norbury & Bishop, 2002). In addition to language-related impairments, receptive-SLI has been associated with slower processing speed for both verbal and non-verbal tasks (Lahey, Edwards, & Munson, 2001). While slowed processing seems to affect children with both mixed receptive-expressive and purely expressive impairments, it is particularly evident in children with mixed receptive-expressive language impairments (Windsor & Hwang, 1999). Receptive language impairment is also associated with greater deficits in literacy skills than expressive language impairment. More children with receptive-expressive language impairment, than pure expressive language impairment, struggle with tasks such as word reading and reading comprehension (Simkin & Conti-Ramsden, 2006). Children with receptive language impairment also seem to have deficits in visual and auditory short-term memory, while children with expressive language impairment seem to have deficits mainly in auditory short-term memory (Nickisch & Von Kries, 2009).

Problems in comprehension are often more difficult to diagnose than those in expressive language, and can manifest as restlessness, behavioural issues and withdrawal (McGrath et al., 2008). Children with receptive language impairment are at greater risk for negative outcomes than children with expressive language impairment, and less is known about effective ways of treating receptive language impairment (Boyle, Mccartney, O'Hare, & Law, 2010)

1.1.3 The role of parent-child interaction in SLI

The underlying causal mechanism behind SLI is a functional brain abnormality, contributed to by a strong genetic component (Bishop, 2003). Risk factors such as low birthweight (Stanton-Chapman, Chapman, Bainbridge, & Scott, 2002) and low socioeconomic status (Pungello et al., 2009) have been found to increase the risk of developing SLI, but are not considered explicative of the causal mechanism (Hammer et al., 2001). Although features of the linguistic environment have been associated with a child's early language development (Hurtado, Marchman, & Fernald, 2008; Majorano, Rainieri, & Corsano, 2013), researchers have not found any significant deficits or impairments in parents' language that would explain the development of language impairment in children (Bishop, 2003). Research suggests that parents of children

with SLI do not differ systematically from parents of typically developing children in the way they use language (Bishop, 2003).

Nevertheless, language development occurs in the context of the parent-child relationship, and features of parent-child interaction have been found to influence language development. For example, a considerable amount of evidence to suggest that parenting sensitivity has a positive association with a child's language development (Barnett, Gustafsson, Deng, Mills-Koonce, & Cox, 2012; Hammer et al., 2001; Pungello et al., 2009; Stanton-Chapman et al., 2002). Interaction between parents and language-impaired children has been found to differ from interaction with typically developing children in a number of ways, and language impairment presents challenges for sensitive, synchronous parent-child interaction. Considering the role that interaction between parents and children plays in the child's development, both language and otherwise, it is important to examine how language impairment influences parent-child interaction. To understand how a child's SLI impacts communication between children and their parents, we must first examine the central features of parent-child interaction.

1.2 Parent-child interaction

Parent-child interaction plays an important role in overall early development (Majorano et al., 2013). Parent-child interaction is influenced by qualities of both parent and child, the dyad they form together and the dynamic relationships between all three of these components. Parent-child interaction is built on the parent's ability of the parent to adjust their communication and behaviour to the child's individual needs. The interaction between the child's unique temperament and the parent's sensitivity form the basis for the dyadic relationship that emerges between the two. These three central elements together shape the nature of parent-child relationship.

1.2.1 Parenting quality

Parenting quality is a central to parent-child interaction, as the parents' ability to adjust and accommodate for the child's needs largely determines the nature and quality of parent-child interaction. The parent's role is to create an environment which provides the child with positive opportunities for interaction and is sensitive to the child's needs and level of development.

Sensitivity is a core quality of positive parenting. It refers to a parent's responsiveness to their child's cues, and ability to adjust their actions to fit their child's behaviour and emotional state in a prompt manner, and is especially important to the development of self-regulation (Kopp, 1982). Sensitive parenting facilitates the development of self-regulation, by providing the necessary support for their child's individual needs (Kopp, 1982), and has been associated with reduced affective arousal and greater effortful control during the toddler years (Kochanska et al., 2000; Lengua et al., 2007).

Parental warmth and responsiveness are also a core feature of parenting quality. Warmth and responsiveness reflects the level of positive affectivity, acceptance and support expressed by a parent toward their child (Zhou et al., 2002). Parental warmth and positive expressiveness have been associated with higher levels of empathic responding and social competence for children (Zhou et al., 2002). Parental warmth and responsiveness have also been associated with greater security of attachment, which in turn is associated with greater social competence and regulation of negative affect (Davies & Cummings, 1994). Parental warmth and responsiveness have been posited to elicit reciprocal compliance from the child; the child wants to be compliant because their parent is sensitive and responsive to their wishes (Grusec & Goodnow, 1994; Kochanska, 1997).

In addition to sensitivity and warmth, harmonious parent-child interaction requires setting boundaries and limits while continuing to provide opportunities for learning. Scaffolding refers to parental behaviour that guides the child as necessary, while keeping in mind the child's developmental stage and withdrawing support gradually to encourage child autonomy (Conner & Cross, 2003; Lengua et al., 2007). Both consistent limit setting and scaffolding have been linked to greater effortful control in children (Lengua et al., 2007; Lengua et al., 2014). Moreover, parental support of children's autonomy through sensitive scaffolding and facilitation of child participation has been associated with the development of executive functions (Bernier, Carlson, & Whipple, 2010). Lower parental intrusiveness during infancy has also been associated with greater child effortful control at age 2, in children born preterm (Poehlmann, Burnson, & Weymouth, 2014). This suggests that intrusive parenting unlike scaffolding, does not provide sufficient opportunities and support that is sensitive to the child's needs, for the child to learn self-initiated and autonomous control and regulation of

their reactions (Kopp, 1982; Lengua et al., 2014). Intrusive parenting is also negatively associated particularly with expressive language skills (e.g. (Haabrekke et al., 2015; Keown, Woodward, & Field, 2001; Pungello et al., 2009).

1.2.2 Child temperament and self-regulation

Temperament plays a significant role parent-child interaction, influencing how the child responds to the environment and how the child's environment responds to him/her (Chess & Thomas, 1977; Noel et al., 2008). Two central features of temperament are (1) reactivity/negative emotionality (irritability, negative mood, intense negative reactions) and (2) self-regulation (effortful control of attention and emotions) (Rothbart & Bates, 2006). Temperamental reactivity determines how a child reacts to his/her internal or external environment (Rothbart, Sheese, Rueda, & Posner, 2011). Self-regulation determines how the child is able to manage those reactions through effortful control and executive attention (Rothbart et al., 2011). Together reactivity and self-regulation form the basis for the child's temperament, which is the foundation for the child's developing social skills. Temperamental features such e.g. high negative emotionality, and self-regulation capacity, have been associated with a child's social skills (Lengua et al., 2007; Sanson, Hemphill, & Smart, 2004). Effortful control is an important form of self-regulation. Effortful control is "the ability to inhibit a dominant response to perform a subdominant response, to detect errors, and to engage in planning" (Rothbart & Rueda, 2005, p. 3). Effortful control has been associated with prosocial behaviour (Diener & Kim, 2004), restraint and compliance with maternal prohibitions (Kochanska et al., 2000) as well as conscience and moral conduct, cognition and moral identity development (Kochanska, Murray, & Coy, 1997). High effortful control seems to promote positive and socially appropriate behaviour. The combination of low self-regulation and high negative affectivity on the other hand, seems especially harmful to children's social functioning, as the child is prone to outbursts of negative behaviour (Diener & Kim, 2004; Spinrad et al., 2007).

1.2.3 Dyadic synchrony

In addition to features of the child and parent individually parent-child interaction is influenced by dyadic factors, which involve factors that relate to parent and child functioning together, and

to the quality of the parent-child relationship. Focus, on the dyadic features of parent-child interaction is based on the relationship perspective to child socialization, which posits that relationships are more significant than individual factors relating to parent or child, in the child's social development (Aksan, Kochanska, & Ortmann, 2006). Synchrony refers to a pattern of interaction that is regulated by both parent and child in cooperation, that is reciprocal in orientation and responsiveness, and where communication is harmonious and smooth-flowing (Harrist & Waugh, 2002). A high level of dyadic synchrony reflects interactions where both parent and child orient towards each other, and work together to resolve conflict and maintain a positive affective atmosphere. Synchrony is a core feature of parent-child interaction, and has also been associated with a number of traits that are important to social interactions, such as language learning, autonomy and self-control (Harrist & Waugh, 2002), greater verbal and expressive language skills and self-initiated compliance at 3 years (Lindsey, Cremeens, Colwell, & Caldera, 2009), as well as better social skills (cooperation, assertion, responsibility and self-control) as reported by mothers (Pasiak & Menna, 2015). Reciprocity, one of the component factors of dyadic synchrony, has also been linked to social outcomes, has also been associated with a child's greater social competence and lower aggression during preschool (Feldman, Bamberger, & Kanat-Maymon, 2013).

1.3 Parent-child interaction in dyads with SLI children

Parent-child interaction is contingent on three central elements – the features of the child, parent and their dyadic relationship. The nature of the interaction is influenced by all three of these elements and the dynamic relationships between them. Language impairment poses a challenge for parent-child interaction, and sets additional demands for adjustment to the child's deficits in expression and comprehension, for both parent and child. Research on parent-child interaction in dyads with language-impaired children has identified a number of ways in which interactional behaviours of child and parent differ in dyads with language-impaired children when compared with typically-developing children. Studies have focused mostly on conversational features of interaction, such as turn-taking, topic initiation or parental responsiveness. Parent-child interaction is influenced by more than conversational skills, and less is known about the affective and relational components of the behaviour of SLI children in interactions with their parents. Differences have been identified in child and parenting

behaviours, but less is known about the impact of language impairment on dyadic behaviours and synchrony. Moreover, research has focused mostly on comparing language-impaired and typically-developing children, a gap exists in the literature comparing children with different types of language impairment.

1.3.1 Behaviour of SLI children during parent-child interaction

The speech and interactional patterns of children with SLI may differ from their TD counterparts in many ways, but findings have been contradictory. Some studies indicate children with language impairment show difficulties in a number of conversational skills, such as turn-taking (Rescorla, Bascome, Lampard, & Feeny, 2001; van Balkom et al., 2010), topic initiation (Conti-Ramsden & Friel-Patti, 1984; Cunningham et al., 1985; van Balkom et al., 2010), as well as topic maintenance and coherence (Bruce et al., 2010; Rescorla & Fechnay, 1996). Some findings indicate that language-impaired children do not differ significantly from typically-developing children in the amount of speech produced (Conti-Ramsden & Friel-Patti, 1984; Rescorla et al., 2001). The variability in severity and nature of language impairment is likely to be at least partly responsible for producing contradictory research findings.

Less frequent topic initiation is a common finding for children with language impairment, and children with language impairment seem to take a less active lead in conversations with more linguistically skilled peers (Bruce et al., 2010). Despite initiating topics less frequently, language-impaired children seem to benefit from the conversational scaffolding provided by a more skilled partner. Bruce et al. (2010) studied the conversational features of dialogues between ten SLI children and their age-matched controls, comparing this to dialogues of SLI children with language matched controls. Results showed that conversations between SLI children and age-matched control were more responsive and coherent. SLI children exhibited less disruptive conversational input, such as fewer topic shifts, more elaborate responses, and fewer irrelevant utterances, though the only significant difference was in the amount of topic shifts, which speaks to greater cohesiveness in these conversations. Moreover, a significant positive correlation was found between the responsiveness of the conversational partner and the responsiveness of the SLI child. Simultaneously, responsiveness of the conversational partner was negatively associated with topic change and irrelevant contributions, but also topic

initiation. In conversations with language-matched children, children with SLI were more assertive as a significant positive correlation was found between minimal responses (e.g. one word answers) from conversational partners, and more frequent initiations in the SLI child. All of this suggests that children with SLI benefit from the structure and support provided by a more skilled conversational partner, despite their less frequent initiations in such conversations (Bruce et al., 2010). The results from Bruce et al. (2010) would suggest that children with SLI might fare better in parent-child interactions where the parent takes a more active lead in the conversation, providing opportunities for the child to participate through responding and contributing to initiations made by the parent, while simultaneously actively leading and structuring the interaction. However, the study focused only conversations between peers of different linguistic skill-level, thus we can only hypothesize about the dynamics between children and their parents.

Most studies have focused on conversational features of interaction, and less on affective and relational features, which play an important role in parent-child interaction. Skibbe, Moody, Justice and Mcginty (2010) studied the differences in mother-child interaction between language-impaired and typically-developing children. Their results showed that children with language-impairment were less compliant and persistent during storybook-reading with their mothers, than typically-developing children. Moreover, the extent to which language-impaired children participated in the book-reading was dependent on the emotional support provided by the mother both physically and verbally (Skibbe et al., 2010). This suggests that language-impaired children may struggle to participate in parent-child interaction, giving up more easily and encountering more conflictual parent-child interaction. The authors conclude that these differences may be a result of the differences in emotional support provided by the mothers of language-impaired and typically-developing children (Skibbe et al., 2010). Thus, during interactions language-impaired children benefit from both the linguistic support of a more-skilled conversational partner (Bruce et al., 2010) but also from the emotional support provided by a sensitive parent (Skibbe et al., 2010).

Research has focused on comparing language-impaired children to typically-developing children. Most of these studies have either focused on children with expressive language impairment (Rescorla & Fechnay, 1996; Conti-Ramsden & Friel-Patti, 1984) or have included

children with expressive and/or receptive language impairment (Cunningham et al., 1985; van Balkom et al., 2010, Bruce et al., 2010). Furthermore, samples have consisted mostly of children with expressive language impairment. Less is known about receptive language delays and parent-child interaction, than interactional patterns in children with expressive delays (Blackwell, Harding, Babayiğit, & Roulstone, 2015). A gap exists in how children with expressive and receptive language impairments differ in their interactive behaviours, and how different types of impairment influence parent-child interaction.

1.3.2 Parent behaviour during parent-child interaction with SLI children

Research on parent behaviour during interactions with SLI children has focused on responsiveness, and studies conducted on parental responsiveness in dyads with language-impaired children have yielded mixed results. Some studies show that parents are less responsive, speak less and with shorter utterances, asking fewer questions, providing fewer recasts and less topic coherence (Hoffer & Bliss, 1990; Rescorla et al., 2001; Schodorf & Edwards, 1983). Others studies have found no differences in responsiveness between mothers of language-delayed and typically-developing children (Cunningham et al., 1985). Indeed, Bishop (2003) concludes that studies have not been able to identify any particular features of maternal speech that are systematically associated to language impairments.

Studies on recasts suggest that findings regarding reduced parental responsiveness in dyads with SLI children may be explained by the child's level of initiative and activity in the conversation. Recasts refer to replies made by the adult to the child's utterances that clarify and add information while retaining the child's meaning. A study by Conti-Ramsden, Hutcheson and Grove (1995) comparing the frequency of parental recasts with SLI children and children with normal language development, showed that parents of SLI children make fewer simple recasts in conversation than parents of control children. Through further qualitative analysis of conversational sequences, authors determined that recasts with TD children were more often preceded by the child's spontaneous speech, whereas recasts with SLI children were preceded by the child's response to something said by their parent. Authors conclude that it may not be as motivating for the parent to respond to a child's responsive utterance with a recast, as it would be to respond to the child's spontaneous speech (Conti-Ramsden, Hutcheson, & Grove,

1995). The study examined a sample of 18 children aged 22-70 months, six of whom had SLI. The sample included children with mixed receptive and expressive language impairment.

Paul and Elwood (1991) examined maternal speech styles with a group of 28 children aged 20-33 months, who were identified as having slow expressive language development. Similarly to Conti-Ramsden et al. (1995), Paul and Elwood (1991) found that parental responsiveness was related to frequency of the child's utterances. This suggests that differences in parental behaviour between dyads with SLI children and those with typically-developing children may be a result of parents tuning their language and interaction to the child's linguistic capacity (Blackwell et al., 2015; Paul & Elwood, 1991), and thus differences in parental behaviour may be an artefact of the child's limited language ability. This notion is supported by the findings of Majorano and Lavelli (2014), who examined maternal input during shared book-reading with SLI children. The results of the study illustrated that mothers of children with language impairment attune their language to their child's expressive language skills. This study included only SLI children with expressive language impairment.

These findings confirm the results of Hansson, Nettelbladt and Nilholm (2000), who studied conversations between language-impaired children and a parent/peer/clinician, in a sample of ten children with either expressive or expressive and receptive language deficits. The findings of their study showed that children spoke more with adult partners, used a wider variety of words, and produced clearer and more complete utterances in these conversations. Adults were found to be more productive conversational partners than peers, using longer and more frequent utterances, wider vocabulary and more clear and complete utterances. The authors conclude that the improved conversational performance of children with SLI in conversations with adult partners is probably a product of the greater amount of support provided by adults in these conversations, through initiations, recasts and questions (Hansson, Nettelbladt, & Nilholm, 2000).

In addition to parental responsiveness, one study on parent behaviours during interaction with language-impaired children has examined parental supportiveness. Skibbe et al. (2010) examined emotional support provided by mothers of 30 language-impaired and 15 typically-developing pre-school children. Their results showed that while mothers of children with

language-impairment were able to give equally good quality instructions to their children, they were found to be less emotionally supportive than mothers of typically-developing children. The authors hypothesize that child behaviours, like reduced persistence and compliance, may prove irritating for mothers, making it more difficult to provide emotional support and maintain synchronous interaction (Skibbe et al., 2010).

Finally, some studies have illustrated a connection between SLI and increased use of directive and controlling parenting styles (Blackwell et al., 2015; Conti-Ramsden et al., 1995). A review by Blackwell et al. (2015) concludes that the more controlling and directive role taken by parents of children with SLI may be reactionary to the child's passive behaviour during interactions. This is in accordance with research has uncovered concerning the behaviour of SLI children during interactions with their parents and more linguistically advanced peers. This is consistent by the results of Kloth, Janssen, Kraaimaat & Brutten (1998) who studied parent-child interaction in a sample of typically-developing preschool-aged children and their mothers. Kloth et al. (1998) found that mothers of children with less advanced expressive language skills, were more verbally directive and controlling, using more warnings, bans and commands. Higher maternal directiveness was significantly correlated with lower receptive and expressive language achievement for the child. Moreover, a study by Hammer et al. (2001) also found that parents of children with SLI have also reported disciplining their children significantly more often than parents of typically-developing children, by using more time outs and spanking (Hammer et al., 2001), which also supports the association between language impairment and more controlling parenting styles.

1.3.3 Dyadic behaviour during parent-child interaction in SLI dyads

All aspects of parent-child interaction influence each other, as both child and parent attempt to achieve and maintain harmony in their relationship and interactions through mutual orientation and responsiveness (de Weerth & van Geert, 2001; Harrist & Waugh, 2002). Little research was found on verbal, behavioural or affective parent-child synchrony in dyads with SLI children. Rescorla and Fechnay (1996) compared dyadic synchrony in eighteen parent-child pairs with late-talkers to a group of children matched for aged and socioeconomic status. Findings indicate that dyads with late talkers did not differ from those with typically-developing

children, in features of maternal or child synchrony. However, results also indicated that controlling mothers had lower levels of synchrony. Taken together with research findings on parent interactional behaviours, it is possible that some parents of SLI children who have more directive and controlling parenting styles, might have lower levels of dyadic synchrony than dyads with typically-developing children. No studies were found on the differences in synchrony between children with receptive and expressive difficulties, and a paucity of information exists on how different types of language impairments influence dyadic synchrony, and whether some dyads are more at-risk to developing poor synchrony.

1.4 The present study

The transactional nature of the associations between parent and child behaviours evidenced by the findings of the studies discussed above, illustrates the important of examining child, parent and dyadic factors simultaneously in order to account for interactional patterns in dyads with SLI children. None of the studies mentioned has taken in to account all three elements of parent-child interaction – namely the child, the parent and their dyadic relationship. Considering the transactional nature of relationships between child traits and behaviours, parenting quality as well the dyadic relationship, as well as how all of the above impact language development, it seems necessary to examine all three elements of the parent-child relationship and how interactional patterns in language-impaired children differ. Moreover, most studies have included either children with only expressive language impairment or mixed expressive/receptive impairments. Considering the scarcity of information on interactional patterns in children with receptive language impairment, it would be fruitful to compare in what ways they differ from those of children with expressive language impairment. Finally, the sample sizes of all studies including children with language impairment were low. Greater sample size could allow for more statistical power and thus, enable a more thorough examination of the interrelationships between child, parent and dyadic factors in parent-child interaction with SLI children. This study aims to examine child-, parent- and dyadic features of parent-child interaction in parent-child pairs with SLI children. This study aims to compare how child, parent dyadic factors of parent-child interaction differ when children have expressive vs. receptive language impairments.

1.5 Research questions

Research question 1: Do group differences exist in child behaviour during parent-child interaction, between children with expressive vs. receptive language impairment?

Hypothesis: No hypothesis could be set due to lack of research comparing behaviour of children with expressive and receptive language impairment.

Research question 2: Do group differences exist in how parents interact with children who have expressive vs. versus receptive language impairment?

Hypothesis: No hypothesis could be set due to lack of research comparing the behaviour of parents of children with expressive and receptive language impairment.

Research question 3: Do group differences exist in dyadic behaviours during parent-child interaction in parent-child pairs, where children have expressive vs. versus receptive language impairment?

Hypothesis: No hypothesis could be set due to lack of research comparing behaviour of dyads with children who have expressive and receptive language impairment.

2. Methods

2.1 Participants

The sample was made up of participants of the Helsinki Longitudinal SLI study (HelSLI), which focuses on the risk and protective factors involved in SLI and developmental language disorder (DLD), how these factors impact a child's developing language abilities, as well as advancing specific and effective practices for rehabilitation. The current study was part of the HelSLI-psychosocial subproject, which aims to examine how temperament and interactional environment are connected to language impairment. Participants consisted of children who

were under school-age (seven years), suspected as having specific language impairment, who underwent their initial assessment at the audiophoniatric day-clinic at the Helsinki University Central Hospital during 2013-2015. The purpose of the initial assessment period was to determine diagnosis and organize the requisite rehabilitative measures.

Only monolingual children with Finnish as their first language were recruited for the present study. All children were examined by a phoniatrician or a doctor specializing in phoniatrics for any developmental deficits of the face, mouth and ears. Children with oral anomalies were excluded from the study. The examining doctor also conducted a brief neurological examination and children were also tested for any chromosomal abnormalities. Children with neurological disabilities or disorders (e.g. epilepsy) were excluded from the present study. A thorough assessment of hearing was also conducted for those children whose hearing had not been previously assessed, and children with hearing defects were also excluded. Children with an IQ below 84 were also excluded from the present study, as were children diagnosed with autism spectrum disorders.

Of children attending the day-clinic for an initial assessment in 2013-2015, who were recruited and fit the criteria for the study, 141 children were invited to participate. Of these children, parental consent was attained and both videotaping and cognitive testing were successfully conducted for 120 parent-child pairs. One child was excluded from the study because the videotaping was conducted with someone other than a parent. The relationships between a child and his/her parents are highly unique, and this pair was not considered representative. Thirty five children were removed from the sample because of diagnoses other than expressive or receptive language impairment, concurrent diagnoses that were considered to interfere with the aim of the study (F83 Mixed specific developmental disorders, autism spectrum disorders, epilepsy), and chromosomal abnormalities. Children with concurrent disorders that were not considered significant for aims the study were included in the sample. The most common concurrent diagnosis was F82 Specific developmental disorder of motor function. Other concurrent diagnoses were for somatic illnesses. The final sample consisted of 85 children, of whom 53 had been diagnosed with expressive language impairment and 32 with receptive language impairment. Children in the sample were aged between 3 years 0 months to 6 years 9 months. Mother's age at childbirth ranged from 19-41 years. Socioeconomic status was

determined by parental education, which was evaluated on a three-point scale (1 = grades 1-9 or less, 2 = secondary education, 3 = bachelor's degree or above).

Table 1. *Sample characteristics*

	Total	F80.1	F80.2	
	N = 85	n = 53	n = 32	*p*
Male N (%)	66 (77.6 %)	38 (71.7 %)	28 (87.5 %)	.09
Childs age, months M (SD)	50.63 (10.16)	48.48 (9.82)	54.18 (9.86)	.01
Parents' educational attainment [a] M (SD)	2.48 (.68)	2.55 (.64)	2.37 (.75)	.26
Low N (%)	9 (10.60)	4 (7.50)	5 (15.60)	
Middle N (%)	26 (30.60)	16 (30.20)	10 (31.30)	
High N (%)	50 (58.80)	33 (62.30)	17 (53.10)	
Mother's age at childbirth, years [b] M (SD)	29.88 (4.76)	30.01 (4.57)	29.67 (5.13)	.75

Notes: F80.1 = expressive language impairment, F80.2 = receptive language impairment. P= probability value from chi-squared test of independence. Values shown as mean (standard deviation) or number (%), as applicable.
[a]Two parents of F80.1 children and 3 parents of F80.2 children failed to report their educational attainment. These values were imputed using the median.
[b]Five parents of F80.1 children and eight parents of F80.2 children failed to provide their age at childbirth. These values were imputed using the expectation-maximization method.

2.2 Procedures

Videotaping was conducted in an examination room at the day-clinic, by nurses working at the clinic, who had received training. Children and their parents were videotaped during three different tasks – drawing, free-play, and assembling a puzzle. Both the drawing and puzzle tasks were goal-oriented and had clear aims, while the free play task was less structured. Videotaping was continuous, each task was evaluated and scored separately. The recommended length for each task was five minutes, and parents and children were instructed on when to move on to the next task. Otherwise the nurses tried to remain as removed as possible from the interactions.

The three tasks were always presented in the same order. In the drawing task children and their parents were given paper and coloured pencils and asked to draw something together. This was followed by free-play, where children and parents were given a basket of toys containing plastic animals and blocks and asked to play freely. In the puzzle-making task, children and parents

were invited back to the table and given a puzzle to complete together. Puzzles were selected to fit the child's level of development. If the puzzle proved very easy or very difficult for the child to complete, the children were given a different puzzle. No particular instructions were given to the parents regarding the aims of the task or how much guidance they should give their child. The aim of the videotaping was to capture parent-child pairs behaving as they would usually. Videos varied in length depending on the pace of the individual parent-child pairs. Videos ranged approximately 9-25 minutes in length.

2.3 Assessment methods

2.3.1 Child behaviour

Child behaviour were assessed using the child behaviour scales of the 1990 revision of Erickson's sensitivity scales (Egeland, Erickson, Clemenhagen Moon, Hiester & Korfmacher, 1990) during a drawing task and a puzzle task by two research assistants, who had received training for using Erickson's scales. Child behaviour was evaluated on all seven child behaviour scales, namely enthusiasm, persistence, negativity, compliance, experience of the session, avoidance, and affection towards the parent (Egeland et al., 1990). All seven aspects child behaviour were evaluated on a seven-point scale. Low scores indicate that the child displays very little/none of the behaviour in question, and high scores indicating that the child displays this behaviour very frequently. Enthusiasm refers to the extent to which the child approaches the task in an energetic, self-confident, eager and goal-oriented manner. Persistence reflects whether the child's motivation and ability to participate consistently and striving to find solutions to problems the task poses. Negativity measures the expressions of anger, dislike or hostility expressed by the child through rejection, opposition or unreasonable demands made on the parent. Compliance assesses the extent to which the child listens to and adjusts his/her behaviour to their parents' instructions and requests. Experience of the session evaluates the child's experience of interaction with their parent during a goal-oriented task. It assesses whether the child is able to participate in completing the task, and experience feelings of competence and autonomy. It also takes in to account whether the child is able to trust that interaction with their parent will proceed smoothly. Affection towards parent measures the amount of positive affectivity shared by parent and child, as well as the child's tendency to

approach and express positive emotions toward their parent. Avoidance measures the extent to which the child withdraws from interaction with their parent or rejects their parent (Egeland et al., 1990).

Inter-rater reliability was evaluated based intra-class correlations calculated for seven videos, scored by both research assistants. In the drawing task, intra-class correlation coefficients were above 0.8 for all variables except for child's enthusiasm (ICC=.74) indicating at least moderate reliability for all child behaviour scales (Koo & Li, 2016). For the puzzle task, ICCs were above 0.8 for all child behaviour scales except child's negativity, which could not be calculated as variation between participants was too small. Nevertheless, raters agreed on 85.7% of their ratings.

2.3.2 Parent behaviour

Parenting behaviour was assessed using the parent behaviour variables of the 1990 revision of Erickson's sensitivity scales (Egeland et al., 1990) during a drawing task and a puzzle task by two research assistants, who had received training for using Erickson's scales. Parent behaviour was evaluated on supportive presence, hostility, intrusiveness, clarity of instruction, sensitivity and timing of instruction and confidence. All six aspects of parent behaviour were evaluated on a seven-point scale. Low scores indicate that the parent displays very little/none of the behaviour in question, and high scores indicate that the parent displays this behaviour very frequently. Supportive presence measures to extent to which the parent provides the child with emotional support by giving positive feedback and encouraging the child through verbal comments and positive regard. A supportive parent is available to the child when he/she needs them, and they create an emotional atmosphere that is supportive and encouraging. Parental hostility refers to the negative feelings expressed by the parent toward their child. Specifically, hostility refers to the parent's tendency to reject or disparage their child, or become easily angered. Even small expressions of hostility were given significance, as parents are less likely to express negative affectivity during videotaping. Intrusiveness measures the parent's tendency to interfere with the child's behaviour, and show a lack of respect for the child as an agent. Intrusiveness is distinguished from appropriate setting of boundaries as behaviour that interferes with the child's attempts to participate in the task. Clarity of instruction assesses the

parent's ability to give clear instructions that are appropriate to the child's level of understanding, and that facilitate the child's participation in the task by providing structure, aims and clear feedback. Sensitivity and timing of instruction reflect the parent's ability to time and adjust their instructions to the child's behaviour. Parents with high levels of sensitivity observe their child's behaviour, give instructions when the child needs them and are able to modify their instructions to suit the child's needs. Confidence refers to parent's ability to approach the situation in a manner that reflects confidence in their relationship with the child, and a belief that the interaction will go smoothly or that conflicts can be resolved in a timely manner. Confident parents set appropriate expectations on their child, and trusts their ability to interact with their child in a positive manner (Egeland et al., 1990).

Inter-rater reliability was assessed using intra-class correlations calculated for seven videos, scored by both research assistants. In the drawing task, intra-class correlation coefficients were above 0.8 for all variables except for parent confidence (ICC=.57). ICC could not be estimated for parent hostility due to little variation between subjects, but examination of ratings indicates that raters had 87.5% agreement. For the puzzle task, ICCs were below 0.8 for intrusiveness (ICC=-.30), supportive presence (ICC=.65) and confidence (.64). A decision was made to eliminate intrusiveness from the puzzle-making task due to low inter-rater reliability. ICC could not be calculated for hostility due to little variation between participants, but raters had 100% agreement in ratings.

2.3.3 Dyadic behaviour

Dyadic behaviour was assessed using three instruments. Two dyadic dimensions from Erickson's sensitivity scales (Egeland, Erickson, Clemenhagen Moon, Hiester & Korfmacher, 1990) were evaluated during the drawing and puzzle tasks: quality of the relationship and dissolution of physical/psychological parent-child boundaries. These two variables were scored on a seven-point scale. Quality of the relationship is a global measure of the mutuality, relatedness, engagement and shared affect and verbal interactions. A high quality of parent-child relationship is expressed through a high amount of shared positive affect and mutual orientation. Both parent and child strive to maintain harmonious interaction and attune their behaviour to each other. Both parent and child also seem to enjoy the interaction. Dissolution

of parent-child boundaries refers to the extent to which parent and child maintain their respective roles during interaction, and the extent to which physical and psychological interpersonal boundaries are respected by both. Psychological boundary dissolution is characterised by interactions where the child is in control of the situation and the parent is not able to give instruction and set appropriate expectations for the child to follow those instructions. Physical boundary dissolution is characterised by a situation where the parent interferes with the child's behaviour through ill-timed displays of affection (Egeland et al., 1990). Dyadic behaviour was also assessed on mutually responsive orientation (MRO) (Aksan, Kochanska, & Ortmann, 2006), which assesses five dyadic dimensions: harmonious communication, coordinated routines, mutual cooperation and emotional ambience. A high level of mutually responsive orientation is characterised by interactions that are responsive, coordinated, smooth-flowing, where parent and child are attuned to each other, behave cooperatively and show positive affect toward each other (Aksan et al., 2006). MRO was evaluated on a five-point scale, for all three of the tasks.

Inter-rater reliability was assessed based on seven videos scored by both research assistants, using intra-class correlations. Intra-class correlations were calculated separately for ratings of dyadic behaviour variables in the drawing and puzzle tasks. In the drawing task, ICCs were above 0.8 for all dyadic scales. For the puzzle task, ICCs for quality of the relationship and MRO were sufficient, but poor for dissolution of boundaries (ICC=.62). For the free play task, ICC for MRO was poor (ICC=.45). Examination of ratings suggests that raters had very good agreement overall for whether MRO was low, moderate or high, and ratings usually differed by one point.

2.4 Confounding variables

Child's age was controlled for in the analyses as age clearly influences the child's language skills, with higher skill-level associated with higher level of development. Age can also influence parent-child interaction, with children of different ages reacting and responding to their parent's in different ways. Child's sex was also controlled for, as boys and girls may have different ways of interacting with their parents, and display more or less of certain kinds of behaviours during interaction. Socioeconomic status was also controlled for, as the

association between socioeconomic status and language impairment is well-documented and robust. Finally, mother's age at childbirth was also controlled for in order to account for biological risk factors to child development associated with giving birth at a later age. Child's age (months) and sex as well as mother's age at childbirth were collected from the background information forms that families had filled out. Missing values for mother's age at childbirth (n=13) were replaced using expectation-maximization imputation. Socioeconomic status (SES) was based on parental education as reported by families in the background information form. The family's SES was determined by the highest level of education attained by either the child's mother or father. Missing values for SES (n=5) were replaced using the mean of all values in the sample.

2.5 Statistical analysis

Data was analysed using IBM SPSS Statistics v23. Examination of the distributions of variables measuring parent-child interaction lead to the selection of two separate tools for analysing differences between the two diagnostic groups. All variables of parent-child interaction that met the assumptions for parametric methods were analysed using univariate analyses of covariance (ANCOVA). Covariates were child's age and sex, mother's age and family SES. Four variables with heavily skewed distributions (child's avoidance, child's negativity, parent's hostility, parent's intrusiveness) were analysed using Mann-Whitney U tests. False discovery rate (FDR; (Benjamini & Hochberg, 1995) was used to correct for increased Type I error rate from running multiple analyses.

3. Results

3.1 Effect of language impairment on child behaviour variables

In response to the first research question, we examined whether child behaviour during parent-child interaction differed for children with expressive (F80.1) and receptive (F80.2) language impairment, using univariate ANCOVAs and Mann-Whitney U tests. For ANCOVAs diagnostic group (F80.1 expressive-SLI or F80.2 receptive-SLI) was the independent variable, and persistence, enthusiasm, compliance, experience of the session and affection towards parent (Egeland et a., 1990) were dependent variables. Covariates used were child's age and gender, mother's age at childbirth and SES. In the drawing task, language impairment had a statistically significant main effect on persistence, enthusiasm, compliance and experience of the session (Table 2). Children with expressive language impairment showed more persistent and enthusiastic behaviour during the drawing task, were more compliant and had a better experience of the session than children with receptive language impairment. In the puzzle task, language impairment did not have a statistically significant main effect on any of the child behaviour variables. Mann-Whitney U tests were used to examine the effect of language impairment on child negativity and avoidance, as these variables had heavily positively skewed distributions. Hostility and negativity did not differ statistically significantly for children with expressive (F80.1) and receptive (F80.2) language impairments during both drawing and puzzle tasks.

Table 2. *Results of univariate analyses of covariance (ANCOVA) and Mann-Whitney U tests on the effect of diagnostic group on child behaviour. ANCOVAs were conducted controlling for child's age and gender, mother's age at childbirth and SES.*

	F80.1	F80.2	F (1,79)	U	*p*	FDR corrected *p*
	M (SD)	M (SD)				
Drawing task						
Persistence	4.79 (1.63)	4.06 (1.70)	8.07		.01	.02
Enthusiasm	4.72 (1.66)	3.91 (1.53)	6.37		.01	.03
Compliance	5.17 (1.21)	4.44 (1.11)	5.59		.02	.04
Experience of the session	5.02 (1.05)	4.19(1.06)	10.39		.00	.01
Affection towards parent	4.49 (1.51)	3.75 (1.57)	3.53		.06	.08
Negativity	1.15 (.46)	1.22 (.61)		812.50	.58	.58
Avoidance	1.49 (.75)	1.84 (.92)		648.00	.04	.06
Puzzle task						
Persistence	5.77 (1.30)	5.81 (1.12)	.17		.68	.99
Enthusiasm	5.06 (1.22)	5.09 (1.25)	.00		.99	.99
Compliance	5.45 (1.01)	5.69 (1.00)	1.13		.29	.96
Experience of the session	5.00 (.96)	5.03 (.97)	.01		.95	.99
Affection towards parent	3.40 (1.35)	3.00 (1.59)	.68		.41	.96
Negativity	1.23 (.577)	1.16 (.369)		831.50	.82	.99
Avoidance	1.30 (.638)	1.38 (.609)		773.00	.37	.96

Notes: F80.1 = expressive language impairment, F80.2 = receptive language impairment. M =mean, SD = standard deviation. The F-ratio and corresponding probability values are given for ANCOVAs, U statistics and corresponding probabilities are given for Mann-Whitney U tests. False discovery rate (FDR) correction was used to correct for increased Type I error rate from multiple analyses. Probability values for Mann-Whitney U are asymptotic significance values.

3.2 Effect of child's language impairment on parent behaviour variables

In response to the second research question, we examined whether child's language impairment had an effect on parent behaviour during parent-child interaction. Analyses were conducted using univariate ANCOVAs and Mann-Whitney U tests. For ANCOVAs diagnostic group (F80.1 expressive-SLI or F80.2 receptive-SLI) was used as the independent variable. Dependent variables used were parent's supportive presence, clarity of instruction, sensitivity and timing of instruction and confidence (Egeland et a., 1990). Covariates were child's age and gender, mother's age at child birth and SES. After adjustment for covariates, no statistically significant main effect was identified for language impairment on supportive presence, clarity of instruction, sensitivity and timing of instruction or confidence between parents of children with expressive (F80.1) and receptive (F80.2) language impairment during the drawing or the puzzle task (Table 3). Mann-Whitney U tests were used to examine the effect of language impairment for parent's hostility and intrusiveness, as their distributions were heavily positively skewed. Parent hostility and intrusiveness did not differ significantly for parents of children with expressive (F80.1) and receptive (F80.2) language impairment during both drawing and puzzle tasks.

Table 3. *Results of univariate analyses of covariance (ANCOVA) and Mann-Whitney U tests on the effect of diagnostic group on parent behaviour. ANCOVAs were conducted controlling for child's age and gender, mother's age at childbirth and SES.*

	F80.1	F80.2	F (1,79)	U	*p*	FDR corrected *p*
	M (SD)	M (SD)				
Drawing task						
Supportive presence	5.13 (1.27)	4.59 (1.24)	2.00		.16	.24
Clarity of instruction	3.92 (1.40)	3.50 (1.24)	1.02		.32	.38
Sensitivity and timing of instruction	4.57 (1.37)	3.75 (1.16)	4.52		.04	.22
Confidence	4.94 (1.25)	4.44 (1.19)	1.56		.13	.24
Hostility	1.21 (.57)	1.09 (.30)		796.50	.42	.42
Intrusiveness	1.66 (1)	1.91 (.96)		703.50	.15	.24
Puzzle task						
Supportive presence	5.08 (1.32)	4.56 (1.29)	.52		.48	.91
Clarity of instruction	4.43 (1.23)	4.06 (.98)	.27		.61	.91
Sensitivity and timing of instruction	5.00 (1.29)	4.78 (1.16)	.01		.91	.91
Confidence	5.36 (.65)	4.94 (.98)	3.54		.06	.38
Hostility	1.08 (.267)	1.09 (.390)		839.00	.85	.91

Notes: F80.1 = expressive language impairment, F80.2 = receptive language impairment. M =mean, SD = standard deviation. The F statistic and corresponding probability values represent the results of ANCOVAs, U statistics and corresponding probabilities represent the results of Mann-Whitney U tests. False discovery rate (FDR) correction was used to correct for increased Type I error rate from multiple analyses. Probability values for Mann-Whitney U are asymptotic significance values.

3.3 Effect of child's language impairment on dyadic behaviour variables

In response to the third research question, we examined whether dyadic behaviours during parent-child interaction differed for dyads with children who had expressive (F80.1) and receptive (F80.2) language impairments. Analyses were conducted using univariate ANCOVAs, in which diagnostic group (F80.1 expressive-SLI or F80.2 receptive-SLI) was the independent variable. Dependent variables used were quality of the relationship, diffusion of physical and/or psychological parent-child boundaries (Egeland et a., 1990) and mutually responsive orientation (Aksan, Kochanska & Ortmann, 2006) were dependent variables. Covariates were child's age and gender, mother' age at childbirth and SES. After adjustment for covariates, language impairment did not have a statistically significant effect on dyadic behaviour variables during any of the three tasks. No statistically significant differences were identified for dyadic behaviours between dyads with children who had expressive (F80.1) and receptive (F80.2) language impairments during the drawing, puzzle or free play task (Table 4).

Table 4. *Results of univariate analyses of covariance (ANCOVA) on the effect of diagnostic group on dyadic behaviour. ANCOVAs were conducted controlling for child's age and gender, mother's age at childbirth and SES.*

	F80.1	F80.2	F (1,79)	*p*	FDR corrected *p*
	M (SD)	M (SD)			
Drawing task					
Quality of the relationship	5.09 (1.21)	4.62 (1.07)	2.12	.15	.15
Diffusion of physical and/or psychological parent-child boundaries	1.79 (1.01)	2.34 (1.13)	3.64	.06	.10
Mutually responsive orientation	3.74 (.98)	3.25 (.88)	3.55	.07	.10
Puzzle task					
Quality of the relationship	4.89 (1.10)	4.59 (1.07)	.23	.63	.93
Diffusion of physical and/or psychological parent-child boundaries	1.47 (.72)	1.56 (.95)	.01	.93	.93
Mutually responsive orientation	3.85 (.84)	3.69 (.74)	.20	.66	.93
Free play					
Mutually responsive orientation	3.75 (.88)	3.44 (1.08)	1.18	.28	.28

Notes: F80.1 = expressive language impairment, F80.2 = receptive language impairment. M =mean, SD = standard deviation. The F statistic and corresponding probability values represent the results of ANCOVAs. False discovery rate (FDR) correction was used to correct for increased Type I error rate from multiple analyses.

4. Discussion

Parent-child interaction is a central arena for language development, and language impairments influence parent-child interaction in a number of ways (Bruce et al., 2010; Cunningham et al., 1985; Rescorla & Fechnay, 1996; Skibbe, Justice, Zucker, & McGinty, 2008), and place children at risk for negative developmental outcomes (Antoniazzi et al., 2010; Helland et al., 2014; Whitehouse et al., 2009). This study examined the influence of language impairment on parent-child interaction, by exploring differences in child, parent and dyadic behaviours during parent-child interaction when children had expressive- or receptive-SLI. Language impairment had a statistically significant effect on a number of child behaviours during parent-child interaction. Children with expressive-SLI were more persistent, enthusiastic, compliant and had a better experience of the session overall. These findings provide novel insight in to the influence of expressive and receptive language impairment on the affective and relational components of parent-child interaction. These results also complement the findings of earlier studies, which have identified differences in the interactive behaviours of language-impaired children when comparing with typically developing children (Bruce et al., 2010; Conti-Ramsden & Friel-Patti, 1984; Cunningham et al., 1985; Rescorla & Fechnay, 1996; Skibbe et al., 2010; van Balkom et al., 2010). On the other hand, parent and dyadic behaviours were not found to differ for dyads with children who had expressive and receptive language impairments. These findings add to earlier research, which has produced contradictory findings on the influence of child's language impairment on parent responsiveness (Conti-Ramsden et al., 1995; Cunningham et al., 1985; Hoffer & Bliss, 1990; Majorano & Lavelli, 2014; Paul & Elwood, 1991; Rescorla et al., 2001). They also support earlier findings on the lack of differences in dyadic synchrony between dyads with language-impaired and typically-developing children (Rescorla & Fechnay, 1996).

4.1 The influence of specific language impairment on child behaviour

The first research question addressed whether children with expressive and receptive forms of SLI behaved differently during parent-child interaction. The findings of the present study illustrated that children with expressive-SLI differed from children with receptive-SLI in how they interact with their parents. Children with expressive-SLI were more engaged with and

approached tasks more enthusiastically and with greater persistence than children with receptive language impairments. These findings are in line with, and add to the findings of Skibbe et al. (2010) who found that language-impaired children were less persistent than typically-developing children. Other studies comparing language-impaired children to typically-developing children have found that SLI children participate less actively in conversations, initiate topics less frequently, struggle with maintaining topics and have difficulty with basic conversational skills like turn-taking (Bruce et al., 2010; Conti-Ramsden & Friel-Patti, 1984; Cunningham et al., 1985; van Balkom et al., 2010). The findings of the present study add to this body of research by illustrating that expressive and receptive language impairments influence parent-child interaction differently, and children with receptive-SLI may less persistent and enthusiastic during parent-child interaction than children with expressive-SLI. This is also in line with the notion that children with receptive-SLI typically have more severe deficits than children with expressive-SLI (Clark et al., 2007). Considering that language-impaired children benefit from the emotional support (Skibbe et al., 2010) and scaffolding provided by a more skilled conversational partner (Bruce et al., 2010), the findings that children with receptive-SLI participate less enthusiastically and persistently suggests that these children might need stronger verbal and emotional support to facilitate active participation in interactions than children with expressive-SLI.

Furthermore, results of the present study show that children with expressive SLI were found to be more compliant to their parents' directives. These findings regarding compliance suggests that children with expressive-SLI had less conflictual interactions with their parents, and were more likely to agree to their parent's requests than children with receptive language impairment. These findings add to those of Skibbe et al. (2010), who found language-impaired children to be less compliant than typically-developing children. These findings suggest that the severity and type of language impairment influences how compliant children with SLI are towards their parents, by showing that children who struggle to understand spoken language are likely to be less compliant than children who struggle with producing speech. Moreover, these findings show that lower enthusiasm, persistence and compliance also translate to a poorer experience of the session overall. Findings regarding overall experience are novel, and show that during parent-child interaction children with receptive-SLI experience fewer feelings of accomplishment and competence, and more conflict or rejection, which may also reduce their

trust in parent-child relationship. Parent-child interaction plays an important role in many areas of socioemotional development, and sensitive and warm interactions between parents and children are important for important developmental hallmarks, such as the development of self-regulation (Kochanska et al., 2000; Lengua et al., 2007) as well as the development of expressive and receptive language skills (Hammer et al., 2001; Noel et al., 2008; Pungello et al., 2009). Difficulties in engaging and participating in interaction with parents, and having less positive experiences of these interactions, may place children with receptive language impairment at risk for issues in psychosocial adjustment and gives them less opportunity to develop their language skills.

4.2 Child's specific language impairment and parent behaviour

The second research question addressed whether parents of children with expressive and receptive forms of SLI differ in how they behave during parent-child interaction. The findings of this study illustrated that parents of children with expressive and receptive language impairments did not differ significantly in how they interact with their children. Though no prior research has compared parents of children with expressive- and receptive-SLI, these findings echo results from those lines of research that have illustrated that parents of language-impaired children do not differ systematically from parents of typically developing children in their language use (Bishop, 2003; Cunningham et al., 1985). On the other hand, there is a body of literature suggesting that, compared to parents of typically developing children, parents of language-impaired children are less emotionally supportive (Skibbe et al., 2010) and responsive (Hoffer & Bliss, 1990; Rescorla et al., 2001; Schodorf & Edwards, 1983). In the present study, parents of children with receptive impairments did tend to be less emotionally supportive and give less clear and sensitive instruction than parents of children with expressive impairments, but these differences did not reach statistical significance. This adds to previous research comparing parents of typically developing and language-impaired children, showing that though language impairment may influence parent-child interaction, the type of language deficit may not have significant and systematic impact on how parents behave. This may be due to the variability in strategies used by parents of children with language impairment in adapting to their child language deficits.

Furthermore, some previous research comparing parent behaviour of language-impaired and typically developing has suggested that parents might compensate for their child's language deficits by taking a more active role in conversation (Conti-Ramsden & Friel-Patti, 1984). Indeed, studies have shown that children benefit from this kind of conversational scaffolding (Bruce et al., 2010; Hansson, Nettelbladt, & Nilholm, 2000). Considering that children with receptive language impairment experience more severe language deficits, and given that children with receptive language impairment were less persistent, enthusiastic, compliant, and had a poorer overall experience of the session, one might expect their parents to have been more active, supportive and use more clear instruction to give their children more guidance to facilitate the child's participation. Though the findings of the present study showed that parents of children with receptive-SLI were slightly more intrusive, this result did not reach statistical significance and there was no evidence to show that parents of children with more extensive language impairments (receptive-SLI) would compensate for their child's language deficits by providing more support than parents of children with purely expressive impairments.

Instead, parents of children with receptive-SLI tended to provide slightly less support, use less clear and sensitive instruction and be slightly less confident in their parenting. These findings gives tentative support to the notion that parent behaviours with language-impaired children may reflect their child's behaviour and language deficits (Blackwell et al., 2015; Conti-Ramsden & Friel-Patti, 1984; Paul & Elwood, 1991). Previous research has shown that parents of language-impaired children may be less responsive, because conversations with their children provide fewer opportunities for interaction (Cunningham et al., 1985; Paul & Elwood, 1991). Thus, the tendency of parents of children with receptive-SLI to be less supportive and give less clear and sensitive instruction may reflect the fact that some parents of children with receptive-SLI may struggle to find opportunities for giving support and instruction. Notably however, differences in parent behaviours were not statistically significant, which suggests that there is significant variability in parent behaviours and parents attune to their children in variable and unique ways that reflect their personality and their child's temperament.

4.3 Child's specific language impairment and dyadic behaviour

In response to the third research question, the findings of this study illustrated that dyads with children who had expressive and receptive language impairments, did not differ from each other in the overall quality of their relationship and responsive orientation towards each other. Dyads with children who had expressive and receptive language impairments also maintained parent- and child-roles equally well, and adhered to the psychological and physical boundaries between parent and child. A study by Rescorla and Fechnay (1996) compared dyadic synchrony in dyads with language-impaired children to dyads with typically-developing children, and found them to be similar in their levels of synchrony. The present study adds to the results of Rescorla and Fechnay (1996), and illustrates that dyads with children who have expressive and receptive language impairments are also similar in their levels of dyadic synchrony. Considering that statistically significant differences were found only in the behaviour of children with expressive and receptive language impairments, but no differences were apparent in the quality of the relationship between parents and their children, these findings suggest that parents of language-impaired children attune certain aspects of their behaviour to that of their children to ensure smooth-flowing and harmonious interaction. The fact that differences in child behaviours were not accompanied by a poorer quality of relationship or lower level of mutually responsive orientation at the dyadic level, suggests that parents of children with receptive-SLI are able to uphold smooth-flowing and harmonious interaction despite the challenges posed by features of child behaviour.

4.4 The influence of context on parent-child interaction

Notably differences in parent-child interaction between dyads with children who had expressive and receptive forms of SLI were only discernible during the drawing task. No differences were identified in child, parent or dyadic behaviours during the puzzle-making task or the free play situation. This suggests that parent-child interaction is context-contingent. Hoffer and Bliss (1990) had similar findings when comparing parent-child interaction in language-impaired and typically developing children. Their results showed that maternal responsiveness differed more for language-impaired and typically developing children in an unstructured play task than it did in a structured task. It is possible that in the present study, the drawing task proved more

challenging for parents and children, because though the task had a clear aim (i.e. to draw a family), there were many possible ways to approach this aim. As a more open-ended situation, the drawing task required more input and scaffolding from the parent, as well as more initiative from the child. Thus, children who are less persistent and enthusiastic and do not receive sufficient and sensitive scaffolding to succeed have a more negative experience of the situation. The puzzle-making task on the other hand, was much more structured, and required less parental input.

4.5 Limitations

A significant strength of this study were the sample size and nature of the sample. Only children who had received a formal diagnosis of expressive or receptive specific language impairment were selected for this study. Most studies have been conducted on small samples, and the sample size of this study significantly improves the reliability of conclusions that can be made based on these findings. Moreover, many studies have included mostly children with expressive language impairment, or children simply classified as late-talkers. A sample of children with formal diagnoses who have been thoroughly examined by a neurologist, psychologist and speech therapist is a significant strength of this study. Moreover, parent-child interaction was examined through child, parent and dyadic behaviours, which allowed a more in-depth understanding of parent-child interaction.

The present study relied heavily on the ratings made by research assistants regarding the behaviour of children, parents and dyads. Problems in inter-rater reliability for some of the behaviour scales are the main limitation of this study. This limitation was partly controlled for by excluding scales for which inter-rater reliability was particularly problematic. Moreover, a cross-sectional research design does not permit any conclusions regarding causality. Interesting directions for future research would be to explore patterns of interaction in a longitudinal design. In terms of the statistical methods applied, analysis of covariance may not have been a sufficient method of analysis. Examination of the relationships between dependent variables and covariates illustrated that there were some interactions between two dependent variables and two covariates. This suggests that there may have been a systematic pattern of interactions which would have warranted closer inspection, and the use of a multi-level design. Moreover,

scales measuring parent hostility and intrusiveness as well as child negativity were very heavily positively-skewed, and analysis of covariance could not be used for these scales due to violation of the assumption of normality. As a result, some variables had to be analysed using nonparametric measures, which did not permit controlling for child's age, child's gender, family SES or mother's age at childbirth. Though it is logical that parents and children displayed less of these negative behaviours, this also reflects a weakness of videotaping interactions. Parents especially are likely to be more self-conscious and reserved during videotaping, and less likely to display hostile or intrusive behaviour. This affects the ecological validity of the study.

4.6 Conclusions

Children with expressive- and receptive-SLI differ in the extent to which they are able to participate in parent-child interaction, and how they experience interaction with their parents. Thus, the type of SLI seems to most notably influence child behaviours during parent-child interaction. Children with receptive-SLI are less enthusiastic and persistent, and experience more conflict in parent-child interactions with fewer feelings of competence and achievement. Receptive-SLI thus places greater demands on parents to maintain harmonious and smooth-flowing interaction that provides sensitive support and guidance to enable their children to participate and learn. The lack of statistically significant influence of type of SLI on parent behaviours suggests that parents adjust to their child's language impairment in variable ways, and that type of language impairment does not play a significant role in determining how parents behave. However, the differences in means tentatively suggest that some parents of children with receptive-SLI may provide less emotional support and instruction to their children. This is in line with previous research showing that parents of language-impaired children may be less responsive, at least partly because conversations with language-impaired children provide fewer opportunities to respond and expand (Blackwell et al., 2015; Conti-Ramsden & Friel-Patti, 1984; Paul & Elwood, 1991). This could also explain why children with receptive-SLI have a poorer experience of the interaction over all, as the interaction does not provide the requisite support and scaffolding to facilitate their participation in the task at hand. This is supported by earlier findings suggesting that language-impaired children benefit from the support and scaffolding provided more active and skilled conversational partners (Bruce et

al., 2010; Hansson, Nettelbladt & Nilholm, 2010). Importantly, the lack of differences between dyads with children who have expressive- and receptive-SLI suggests that parents are nevertheless able to ensure harmonious and coordinated interaction with their children. The quality of the parent-child relationship is thus not influenced by the type of language impairment.

The results of this study give new insight in how language impairment influences parent-child interaction. Considering the central role that parent-child interaction plays in a child's psychosocial and language development, these results suggest that children with receptive-SLI may struggle more to participate in parent-child interaction in ways that strengthen their sense of competence and autonomy. Families with children who have receptive-SLI may thus need more support in this area. Moreover, treatments aimed at improving the child's language development through parent-child interaction so account for the type of language impairment and how this influences parent-child interaction. The findings of the present study provide new insight in to how expressive and receptive-SLI impact parent-child interaction, and how parents work to maintain synchronous interaction with their children.

References

Aksan, N., Kochanska, G., & Ortmann, M. R. (2006). Mutually responsive orientation between parents and their young children: Toward methodological advances in the science of relationships. *Developmental Psychology, 42*(5), 833-848.

Antoniazzi, D., Snow, P., & Dickson-Swift, V. (2010). Teacher identification of children at risk for language impairment in the first year of school. *International Journal of Speech-Language Pathology, 12*(3), 244-252. doi:10.3109/17549500903104447

Barnett, M. A., Gustafsson, H., Deng, M., Mills-Koonce, W., & Cox, M. (2012). Bidirectional associations among sensitive parenting, language development, and social competence. *Infant & Child Development, 21*(4), 374-393. doi:10.1002/icd.1750

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society.Series B (Methodological),* , 289-300.

Bernier, A., Carlson, S. M., & Whipple, N. (2010). From external regulation to self-regulation: Early parenting precursors of young children's executive functioning. *Child Development, 81*(1), 326-339.

Bishop, D. V. M. (2003). Genetic and environmental risks for specific language impairment in children. *International Journal of Pediatric Otorhinolaryngology, 67, Supplement 1,* S157. doi://doi.org/10.1016/j.ijporl.2003.08.014

Bishop, D. V. M. (2006). Developmental cognitive genetics: How psychology can inform genetics and vice versa. *The Quarterly Journal of Experimental Psychology, 59*(7), 1153-1168.

Blackwell, A. K., Harding, S., Babayiğit, S., & Roulstone, S. (2015). Characteristics of parent–child interactions: A systematic review of studies comparing children with primary language impairment and their typically developing peers. *Communication Disorders Quarterly, 36*(2), 67-78.

Boyle, J., Mccartney, E., O'Hare, A., & Law, J. (2010). Intervention for mixed receptive–expressive language impairment: A review. *Developmental Medicine & Child Neurology, 52*(11), 994-999. doi:10.1111/j.1469-8749.2010.03750.x

Bruce, B., Hansson, K., & Nettelbladt, U. (2010). Assertiveness, responsiveness, and reciprocity in verbal interaction: Dialogues between children with SLI and peers with typical language development. *First Language, 30*(3-4), 493-507. doi:10.1177/0142723710370523

Casalini, C., Brizzolara, D., Chilosi, A., Cipriani, P., Marcolini, S., Pecini, C., . . . Burani, C. (2007). Non-word repetition in children with specific language impairment: A deficit in phonological working memory or in long-term verbal knowledge? *Cortex, 43*(6), 769-776. doi://doi.org/10.1016/S0010-9452(08)70505-7

Chess, S., & Thomas, A. (1977). Temperament and the parent-child interaction. *Pediatric Annals, 6*(9), 26-45.

Clark, A., O'hare, A., Watson, J., Cohen, W., Cowie, H., Elton, R., . . . Seckl, J. (2007). Severe receptive language disorder in childhood—familial aspects and long-term outcomes: Results from a scottish study. *Archives of Disease in Childhood, 92*(7), 614-619.

Conner, D. B., & Cross, D. R. (2003). Longitudinal analysis of the presence, efficacy and stability of maternal scaffolding during informal problem-solving interactions. *British Journal of Developmental Psychology, 21*(3), 315-334. doi:10.1348/026151003322277720

Conti-Ramsden, G., & Friel-Patti, S. (1984). *Mother-child dialogues: A comparison of normal and language impaired children* doi://dx.doi.org/10.1016/0021-9924(84)90023-6

Conti-Ramsden, G., Hutcheson, G. D., & Grove, J. (1995). Contingency and breakdown: Children with SLI and their conversations with mothers and fathers. *Journal of Speech, Language, and Hearing Research, 38*(6), 1290-1302.

Cunningham, C. E., Siegel, L. S., Van der Spuy, H., Clark, M. L., & Bow, S. J. (1985). The behavioral and linguistic interactions of specifically language-delayed and normal boys with their mothers. *Child Development, ,* 1389-1403.

Davies, P. T., & Cummings, E. M. (1994). Marital conflict and child adjustment: An emotional security hypothesis. *Psychological Bulletin, 116*(3), 387.

de Weerth, C., & van Geert, P. (2001). Changing patterns of infant behavior and mother–infant interaction: Intra-and interindividual variability. *Infant Behavior and Development, 24*(4), 347-371.

Diener, M. L., & Kim, D. (2004). Maternal and child predictors of preschool children's social competence. *Journal of Applied Developmental Psychology, 25*(1), 3-24.

Dunn, M., Flax, J., Sliwinski, M., & Aram, D. (1996). The use of spontaneous language measures as criteria for identifying children with specific language impairment: An attempt to reconcile clinical and research incongruence. *Journal of Speech, Language, and Hearing Research, 39*(3), 643-654.

Durkin, K., Mok, H., & Conti-Ramsden, G. (2013). Severity of specific language impairment predicts delayed development in number skills. *Frontiers in Psychology, 4*(SEP) doi:10.3389/fpsyg.2013.00581

Feldman, R., Bamberger, E., & Kanat-Maymon, Y. (2013). Parent-specific reciprocity from infancy to adolescence shapes children's social competence and dialogical skills. *Attachment & Human Development, 15*(4), 407-423. doi:10.1080/14616734.2013.782650

Girbau, D., & Schwartz, R. G. (2008). Phonological working memory in Spanish–English bilingual children with and without specific language impairment. *Journal of Communication Disorders, 41*(2), 124-145. doi://doi.org/10.1016/j.jcomdis.2007.07.001

Grusec, J. E., & Goodnow, J. J. (1994). Impact of parental discipline methods on the child's internalization of values: A reconceptualization of current points of view. *Developmental Psychology, 30*(1), 4-19.

Haabrekke, K., Siqveland, T., Smith, L., Wentzel-Larsen, T., Walhovd, K., & Moe, V. (2015). Mother-child interaction and early language skills in children born to mothers with substance abuse and psychiatric problems. *Child Psychiatry & Human Development, 46*(5), 702-714. doi:10.1007/s10578-014-0512-0

Hammer, C. S., Tomblin, J. B., Zhang, X., & Weiss, A. L. (2001). Relationship between parenting behaviours and specific language impairment in children. *International Journal of Language & Communication Disorders, 36*(2), 185-205. doi:10.1080/13682820010019919

Hannus, S., Kauppila, T., & Launonen, K. (2009). Increasing prevalence of specific language impairment (SLI) in primary healthcare of a finnish town, 1989-99. *International Journal of Language & Communication Disorders, 44*(1), 79-97. doi:10.1080/13682820801903310

Hansson, K., Nettelbladt, U., & Nilholm, C. (2000). Contextual influence on the language production of children with speech/language impairment. *International Journal of Language & Communication Disorders, 35*(1), 31-47.

Harrist, A. W., & Waugh, R. M. (2002). Dyadic synchrony: Its structure and function in children's development. *Developmental Review, 22*(4), 555-592.

Helland, W. A., Helland, T., & Heimann, M. (2014). Language profiles and mental health problems in children with specific language impairment and children with ADHD. *Journal of Attention Disorders, 18*(3), 226-235. doi:10.1177/1087054712441705

Helminen, E., & Vilkman, E. (1990). *Kun puhe viipyy : Kuntoutusohjaus ja dysfaattisen lapsen perhe : Dysfaattisten lasten kuntoutusohjausprojektin loppuraportti 1.5.1986-30.4.1989*. Turku: Afasia- ja aivohalvausyhdistysten liitto.

Hoffer, P. C., & Bliss, L. S. (1990). Maternal verbal responsiveness with language-impaired, stage-matched, and age-matched normal children. *Journal of Applied Developmental Psychology, 11*(3), 305-319.

Hurtado, N., Marchman, V. A., & Fernald, A. (2008). Does input influence uptake? links between maternal talk, processing speed and vocabulary size in spanish-learning children. *Developmental Science, 11*(6), F39. doi:10.1111/j.1467-7687.2008.00768.x

Keown, L. J., Woodward, L. J., & Field, J. (2001). Language development of pre-school children born to teenage mothers. *Infant & Child Development, 10*(3), 129-145. doi:10.1002/icd.282

Kochanska, G. (1997). Multiple pathways to conscience for children with different temperaments: From toddlerhood to age 5. *Developmental Psychology, 33*(2), 228-240.

Kochanska, G., Murray, K., & Coy, K. C. (1997). Inhibitory control as a contributor to conscience in childhood: From toddler to early school age. *Child Development, 68*(2), 263-277.

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36*(2), 220.

Koponen, T., Mononen, R., Rsnen, P., & Ahonen, T. (2006). Basic numeracy in children with specific language impairment: Heterogeneity and connections to language. *Journal of Speech, Language, and Hearing Research, 49*(1), 58-73. doi:10.1044/1092-4388(2006/005)

Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18*(2), 199.

Lahey, M., Edwards, J., & Munson, B. (2001). Is processing speed related to severity of language impairment? *Journal of Speech, Language, and Hearing Research, 44*(6), 1354-1361.

Law, J., Boyle, J., Harris, F., Harkness, A., & Nye, C. (2000). Prevalence and natural history of primary speech and language delay: Findings from a systematic review of the literature. *International Journal of Language & Communication Disorders, 35*(2), 165-188. doi:10.1080/136828200247133

Lengua, L. J., Honorado, E., & Bush, N. R. (2007). Contextual risk and parenting as predictors of effortful control and social competence in preschool children. *Journal of Applied Developmental Psychology, 28*(1), 40-55. doi:10.1016/j.appdev.2006.10.001

Lengua, L. J., Kiff, C., Moran, L., Zalewski, M., Thompson, S., Cortes, R., & Ruberry, E. (2014). Parenting mediates the effects of income and cumulative risk on the development of effortful control. *Social Development, 23*(3), 631-649. doi:10.1111/sode.12071

Leonard, L. B. (2014). *Children with specific language impairment* (Second edition ed.). Cambridge, Massachusetts: The MIT Press.

Lindsey, E. W., Cremeens, P. R., Colwell, M. J., & Caldera, Y. M. (2009). The structure of parent–child dyadic synchrony in toddlerhood and children's communication competence and self-control. *Social Development, 18*(2), 375-396.

Luotonen, M. (1995). Early speech development, articulation and reading ability up to the age of 9. *Folia Phoniatrica Et Logopaedica, 47*(6), 310-317. doi:10.1159/000266368

Majorano, M., Rainieri, C., & Corsano, P. (2013). Parents' child-directed communication and child language development: A longitudinal study with italian toddlers. *Journal of Child Language, 40*(4), 836-859. doi:10.1017/S0305000912000323

Majorano, M., & Lavelli, M. (2014). Maternal input to children with specific language impairment during shared book reading: Is mothers' language in tune with their children's production? *International Journal of Language & Communication Disorders, 49*(2), 204-214.

McGrath, L. M., Hutaff-Lee, C., Scott, A., Boada, R., Shriberg, L. D., & Pennington, B. F. (2008). Children with comorbid speech sound disorder and specific language impairment

are at increased risk for attention-deficit/hyperactivity disorder. *Journal of Abnormal Child Psychology, 36*(2), 151-163. doi:10.1007/s10802-007-9166-8

Nickisch, A., & Von Kries, R. (2009). Short-term memory (STM) constraints in children with specific language impairment (SLI): Are there differences between receptive and expressive SLI? *Journal of Speech, Language, and Hearing Research, 52*(3), 578-595. doi:10.1044/1092-4388(2008/07-0150)

Nicola, K., & Watter, P. (2015). Health-related quality of life from the perspective of children with severe specific language impairment. *Health and Quality of Life Outcomes, 13*, 127. doi:10.1186/s12955-015-0326-1

Noel, M., Peterson, C., & Jesso, B. (2008). The relationship of parenting stress and child temperament to language development among economically disadvantaged preschoolers. *Journal of Child Language, 35*(4), 823-843. doi:10.1017/S0305000908008805

Norbury, C. F., & Bishop, D. V. (2002). Inferential processing and story recall in children with communication problems: A comparison of specific language impairment, pragmatic language impairment and high-functioning autism. *International Journal of Language & Communication Disorders, 37*(3), 227-251.

Pasiak, C., & Menna, R. (2015). MotherChild synchrony: Implications for young childrens aggression and social competence. *Journal of Child and Family Studies, 24*(10), 3079-3092. doi:10.1007/s10826-015-0113-y

Paul, R., & Elwood, T. J. (1991). Maternal linguistic input to toddlers with slow expressive language development. *Journal of Speech, Language, and Hearing Research, 34*(5), 982-988.

Poehlmann, J., Burnson, C., & Weymouth, L. A. (2014). Early parenting, represented family relationships, and externalizing behavior problems in children born preterm. *Attachment & Human Development, 16*(3), 271-291.

Pungello, E. P., Iruka, I. U., Dotterer, A. M., Mills-Koonce, R., & Reznick, J. S. (2009). The effects of socioeconomic status, race, and parenting on language development in early childhood. *Developmental Psychology, 45*(2), 544-557. doi:10.1037/a0013917

Rescorla, L., & Fechnay, T. (1996). Mother-child synchrony and communicative reciprocity in late-talking toddlers. *Journal of Speech, Language, and Hearing Research, 39*(1), 200-208.

Rescorla, L., Bascome, A., Lampard, J., & Feeny, N. (2001). Conversational patterns in late talkers at age 3. *Applied Psycholinguistics, 22*(2), 235.

Rescorla, L., & Ratner, N. B. (1996). Phonetic profiles of toddlers with specific expressive language impairment (SLI-E). *Journal of Speech, Language, and Hearing Research, 39*(1), 153-165.

Roberts, J., Rescorla, L., Giroux, J., & Stevens, L. (1998). Phonological skills of children with specific expressive language impairment (SLI-E): Outcome at age 3. *Journal of Speech, Language, and Hearing Research, 41*(2), 374-384.

Rothbart, M. K., & Rueda, M. R. (2005). The development of effortful control. *Developing Individuality in the Human Brain: A Tribute to Michael I.Posner, ,* 167-188.

Rothbart, M. K., Sheese, B. E., Rueda, M. R., & Posner, M. I. (2011). Developing mechanisms of self-regulation in early life. *Emotion Review, 3*(2), 207-213. doi:10.1177/1754073910387943

Sanson, A., Hemphill, S. A., & Smart, D. (2004). Connections between temperament and social development: A review. *Social Development, 13*(1), 142-170. doi:10.1046/j.1467-9507.2004.00261.x

Schodorf, J. K., & Edwards, H. T. (1983). *Comparative analysis of parent-child interactions with language-disordered and linguistically normal children* doi://dx.doi.org/10.1016/0021-9924(83)90039-4

Silva, P. A., Williams, S., & McGee, R. (1987). A longitudinal study of children with developmental language delay at age three: Later intelligence, reading and behaviour problems. *Developmental Medicine & Child Neurology, 29*(5), 630-640. doi:10.1111/j.1469-8749.1987.tb08505.x

Simkin, Z., & Conti-Ramsden, G. (2006). Evidence of reading difficulty in subgroups of children with specific language impairment. *Child Language Teaching and Therapy, 22*(3), 315-331.

Skibbe, L. E., Moody, A. J., Justice, L. M., & McGinty, A. S. (2010). Socio-emotional climate of storybook reading interactions for mothers and preschoolers with language impairment. *Reading and Writing, 23*(1), 53-71. doi:10.1007/s11145-008-9149-3

Skibbe, L. E., Justice, L. M., Zucker, T. A., & McGinty, A. S. (2008). Relations among maternal literacy beliefs, home literacy practices, and the emergent literacy skills of preschoolers with specific language impairment. *Early Education and Development, 19*(1), 68-88.

Spinrad, T. L., Eisenberg, N., Gaertner, B., Popp, T., Smith, C. L., Kupfer, A., . . . Hofer, C. (2007). Relations of maternal socialization and toddlers' effortful control to children's adjustment and social competence. *Developmental Psychology, 43*(5), 1170.

Stanton-Chapman, T. L., Chapman, D. A., Bainbridge, N. L., & Scott, K. G. (2002). Identification of early risk factors for language impairment. *Research in Developmental Disabilities, 23*(6), 390-405. doi://doi.org/10.1016/S0891-4222(02)00141-5

Stothard, S. E., Snowling, M. J., Bishop, D. V., Chipchase, B. B., & Kaplan, C. A. (1998). Language-impaired Preschoolers: A follow-up into adolescence. *Journal of Speech, Language, and Hearing Research, 41*(2), 407-418.

Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language & Hearing Research, 40*(6), 1245.

van Balkom, H., Verhoeven, L., & van Weerdenburg, M. (2010). Conversational behaviour of children with developmental language delay and their caretakers. *International Journal of Language & Communication Disorders, 45*(3), 295-319.

Whitehouse, A. J., Watt, H. J., Line, E. A., & Bishop, D. V. M. (2009). Adult psychosocial outcomes of children with specific language impairment, pragmatic language impairment and autism. *International Journal of Language and Communication Disorders, 44*(4), 511-528.

Windsor, J., & Hwang, M. (1999). Testing the generalized slowing hypothesis in specific language impairment. *Journal of Speech, Language, and Hearing Research, 42*(5), 1205-1218.

Zhou, Q., Eisenberg, N., Losoya, S. H., Fabes, R. A., Reiser, M., Guthrie, I. K., . . . Shepard, S. A. (2002). The relations of parental warmth and positive expressiveness to children's empathy-related responding and social functioning: A longitudinal study. *Child Development, 73*(3), 893-915.